two series, carefully distinguished, with the same person by name or initials.

When using one figure, *the other should be covered.*

The results, whether from one person or from many, may be sent to the undersigned, who will receive them with thanks. Results from those who know what the illusion is and what to expect need not be sent, *except in cases of persons who do not get the illusion at all, or who only get it for one of the figures.*

Any known defects of eye-sight should be reported; also indications of tastes or pursuits, as of architects, artists, etc., likely to modify the results.

I should also be glad to be referred to any literature which seems to touch upon this illusion.

J. Mark Baldwin.

Princeton, N. J., October 7, 1896.

### Le Conte's Elements of Geology.

To the Editor of Science: I read with great interest Mr. Gilbert's review of Le Conte's Elements of Geology, in Science, No. 95. Having used the book in the classroom I can heartily approve every word of commendation in that review. It is therefore not in the spirit of captious criticism that I venture to point out two or three weaknesses in the book which experience brought to my attention. I do this because Le Conte's Elements is 'a Textbook,' and, if Prof. Simonds' calculations* be correct, only a portion of the teachers of geology are investigators who would detect from their own researches either the strong points or the weak ones of the book. It may be urged that geographical considerations have much weight in my case; yet no more weight with me than would naturally be felt with any other teacher of geology between Lake Huron and the Rocky Mountains north of the 40th parallel.

I desire to call attention only to the following points:

1. Artesian wells are discussed within the limits of a single page (p. 76). Several wells are named, bored in widely separated localities, and the depth reached in each is stated. As the examples given are among the deepest borings in the world the natural inference is that an abundant flow can be found if the contractor only bore deep enough. Such an inference is not only wholly wrong in its practical aspects, but it is not the result of good geological reasoning.

In many portions of the country, notably in the northern belt of states from Ohio to the Rocky Mountains, much attention is given to the subject of Artesian water supply for domestic uses, power and irrigation. Its geology is important. Qualifying conditions must always be weighed and understood. The character of the water is an important factor, since within certain limits its chemical composition determines its usefulness. Within this area the geological character of the formations penetrated have become pretty well known to the depth of half a mile. Yet with all this scientific and economic interest within so large a portion of the United States, there is no aid in Le Conte's Elements for the teacher in the presence of a class anxious to take away something practical, or for the general reader seeking information as to where and how he shall proceed to obtain artesian water, although he is told with much detail how to find the epicentrum and focus of an earthquake.

2. In the subject of historical geology two or three points command attention. The Archean era and system are first to be noted. As the classification on page 295 is compared with that of working geologists, the labors of the last 22 years within the field of Pre-Cambrian geology receive but little recognition. In 1874, in his 2d edition of the Manual, Dana recognizes the 'Primordial or Cambrian,' and places beneath it the Archean with its sub-divisions, Laurentian and Huronian. In 1896 LeConte does the same. Teachers and general readers in geology would receive much more help from the conclusions of the Geological Conference in Washington, January, 1889, in which conference Mr. Gilbert was himself a leading figure, had its results touching these basal formations been used by Professor LeConte.

The Lake Superior basin, with its southerly borders, has been for years the center of interest to students of petrographic and historical geology. The work of Irving, Van Hise and

* Geology in the Colleges and Universities of the United States. Frederic W. Simonds, Science, Oct. 2, 1896, p. 497.

others, in developing this region along the lines of classification marked out by the Conference of 1889, are too well known to require specific attention. That basin portion of the continent is disclosing in striking characters and in magnificent array the successive and continuous steps of progress through the great time gap between the Archean complex and the fully developed faunal conditions of the early Combrian, in which gap, it is believed, lies one-half the geologic history of the globe. The Algonkian seems to be a fact, and a large one too, in North American geology; yet this period is not mentioned save in a single footnote (p. 296). In the four and one-half pages devoted to the Archean, ten lines are given to the rocks of the period, of which 'there is nothing very characteristic, * * * * * except their extreme and universal metamorphism.' The word Huronian does not occur in these pages.

Perhaps a word of caution should be spoken against the impression given by Figs. 264 and 265, that iron ore is interstratified with its associated rocks and hence may reach through to the bottom of the earth's crust. Investigations show that iron ore of the Lake Superior type does not occur as interstratified formations and does not appear to any workable extent in the Archean of North America, as the term Archean is understood among working geologists. In giving 34 per cent. of his Archean space to evidences of life the author says of the leading type that its 'organic origin is not now generally admitted.'

To the writer it would seem that had fewer pages been devoted to geysers and earthquakes, topics of no great geologic significance so far as past researches reveal, and more been given to the subjects enumerated above, geologic science would have been aided in its appeal to the instincts of American students of geology.

3. Finally, from a pedagogical standpoint, this book is to be judged because the author calls it a text-book for colleges. From this standpoint it chief defect lies in the multiplicity of theories advanced and discussed. A text-book should be the exponent of a doctrine. It should be constructed on the definite and positive plan best adapted, in the mind of the author, to expound his body of principles. When several theories are presented and the student practically told to take his choice (p. 100 et seq.), or when he is told that all are true (p. 65), the function of the text-book disappears. The book in so far becomes a compilation of opinions. So far as the development of geologic science goes, the reader is in the dark as to what to believe, unless he assumes that the chronological order of the opinions expressed represents such development. Geology is a science; it has passed the stage of assumption. While much remains to be discovered, worked out and established in geology, still the body of facts and well-understood phenomena now clustering around the subject is sufficient to fill a book. By the presentation of these facts and phenomena the student who leans upon a text-book subjects himself to the inspiration of positive ideas and, in his intellectual processes, acquires that habit of decision so essential to practical success.

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## SCIENTIFIC LITERATURE.

*Die Morphologie und Physiologie des Pflanzlichen Zellkernes, eine kritische Litteratur.* Studie von PROF. DR. A. ZIMMERMANN. Jena, Verlag von G. Fischer. 1896. Pp. viii + 133.

This collection of literature and critical review of the numerous scattered investigations and comparatively few extended studies which have been made upon the nucleus in plant cells is very welcome to all plant cytologists. It is indeed, an excellent and well prepared summary, and avoids the errors of classification, which to some extent impaired the usefulness of the 'Botanisches Mikrotechnik' by the same author.

The work is divided into a general part and a special part. In the former, under the following chapter heads, research methods, nomenclature and general considerations, chemical structure, morphological differentiation of the resting nucleus, nuclear division, nuclear fusion and nuclear physiology, the various observations of a large number of investigators are collected. In this part the two most interesting and useful chapters are those on karyokinesis, in which Zimmermann's views upon